Scientific Article

Dental Needs and Status of Autistic Children: Results From the National Survey of Children's Health

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Abstract: ***Purpose:*** *The purpose of this study was to assess the oral health status and dental needs of a nationally representative sample of 1- to 17-year-old children with or without autism.* ***Methods:*** *In the 2003 National Survey of Children's Health, parents reported their child's oral health status and needs. The condition of the child's teeth, demographics, time since last dental visit, and dental needs were assessed in autistic children (N=495) and nonautistic children (N=95,059). For a subset of children with reported fair or poor teeth, specific problems about their dentition were assessed for autistic children (N=69) and nonautistic children (N=7,002). Weighted percentages and chi-square statistics were calculated.* ***Results:*** *According to parents, 69% of nonautistic children and 52% of autistic children had their teeth in excellent or very good condition (P<.001). The dental status of children with autism and without autism, identified with fair or poor teeth, was comparable.* ***Conclusions:*** *Overall, parents of US autistic children were more likely to report their children's dentition to be in fair or poor condition than parents of US nonautistic children. Children with or without autism who had fair or poor teeth are faced with similar dental problems. (Pediatr Dent 2008;30:54-8) Received February 16, 2007 / Last Revision May 4, 2007 / Revision Accepted May 8, 2007.*

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Autism or autistic disorder is a severe and lifetime developmental disability that is characterized by major impairment in mutual social interactions, communication skills, and repetitive patterns of interests or behaviors.[1] It affects individuals from different ethnic backgrounds and social classes. The diagnosis of autism is based on: (1) the child's developmental and medical history; and (2) observation of the child's social, communicative, and play behaviors.[1]

The onset of autism usually occurs before 3 years of age. Males are 4-5 times more affected than females. Females, however, are more likely to show signs of more severe mental retardation.[2] Most current diagnostic criteria for autism are based on the *Diagnostic and Statistical Manual of Mental Disorders*.[2] A recent study conducted in New Jersey estimated the prevalence of all autism spectrum disorders to be 6.7 cases per 1,000 children.[1] Yeargin-Allsopp and colleagues estimated the prevalence of autism among 3- to 10-year-old children in the 5 counties of metropolitan Atlanta in 1996 to be 3.4 cases per 1,000 children.[3] According to the recent report from the Centers for Disease Control and Prevention on autism among 8-year-old children living in 14 areas of the United States in 2002, the prevalence of autism spectrum disorders per 1,000 children ranged from 3.3 cases in Alabama to 10.6 cases in New Jersey. The majority of sites ranged from 5.2 to 7.6 cases of autism per 1,000 children.[4]

According to an anecdotal report presented by Kopel, autism patients like to maintain their routine behaviors. For example, they are absorbed with their diet, prefer soft and sweet cuisine, and have a tendency to pouch food in their mouths.[5] Four studies describe the oral health status of autism patients. Shapira et al described the oral health and dental needs status of autistic children (N=15) and young adults (N=17) living in Israel. Autistic children enrolled in this study had caries rates similar to those of their healthy peers. Autistic young adults had lower caries rates than functionally independent Israeli adults of the same age, however, they had severe periodontal problems.[6] In this population under study, the most needed dental procedures were scaling, periodontal surgery,oral hygiene, and nutritional instructions.

Lowe and Lindemann assessed the dental needs and abilities of the autistic patient to undergo a dental examination.[7] In this case-control study (N=40), the authors found that autistic patients have a lower hygiene level than healthy individuals, but have a comparable caries rate. A successful examination was achieved on the first attempt by half of the autistic children enrolled in the study. Morinushi and colleagues examined caries experience in Japanese autistic children who participated in

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summer camp in 1980 (N=37) and in 1995 (N=32).[8] The mean caries score (DMFT+dft) was 7.3 in 1980 and 1.8 in 1995. The treatment rate of dental caries was 4% in 1980 and 58% in 1995. This study indicated that the caries experience in autistic children examined in 1995 showed a clear decline from those in 1980. In addition, more autistic children received dental treatment in 1995. According to Klein and Nowak, autistic children are challenging to the dental team due to the reduced ability to communicate and relate to others.[9]

The purpose of this study was to examine the oral health status and dental needs of 1- to 17-year-old US autistic children compared to their nonautistic counterparts using data collected from the 2003 National Survey of Children's Health (**NSCH**).

Methods

The data analyzed in this study are based on the 2003 NSCH, which was supported and developed by the US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau, Rockville, Md, and conducted by the Centers for Disease Control and Prevention, National Center for Health Statistics, Atlanta, Ga.[10] The NSCH was designed to measure national and state-based estimates on the health and well-being of children from birth to age 17 and their families and communities in the United States. A random-digit-dial sample of households with children under 18 years of age was selected from each of the 50 states and the District of Columbia. One child was randomly selected from each household to be a study subject in the survey. The parent or guardian who was the most familiar with the child's health status and health care was chosen as the study respondent. A total of 102,353 interviews was completed, with a weighted response rate of 55%. This survey was conducted from January 2003 to July 2004. It collected information from parents or guardians about:

1. their children's overall health, including:
   a. oral status;
   b. physical and mental health status; and
   c. functional status;
2. health care access and utilization;
3. dental and medical insurance status;
4. family functioning; and
5. social well-being.

The detailed description of the NSCH survey is described elsewhere.[10]

Interviews with parents or guardians of 95,554 children 1 year of age or older who had their natural dentition were collected for this survey. Of these, 495 stated that their child had autism. Being diagnosed with autism was determined from the question in the survey: "Has a doctor or health professional ever told you that (child's name) has autism?" Parents or guardians were asked questions about the:

1. condition of their child's teeth, defined by 4 categories: (a) excellent; (b) very good; (c) good; and (d) fair/poor;
2. time since last dental visit, categorized as: (a) less than 1 year; and (b) 1 year or more.

The primary explanatory variables of interest included the:

1. child's age: (a) 1 to 5 years; (b) 6 to 11 years; and (c) 12 to 17 years;
2. sex;
3. race/ethnicity: (a) Hispanic; (b) non-Hispanic white; (c) non-Hispanic black; and (d) non-Hispanic other;
4. poverty status, based on family income and family size compared to the federal poverty level (FPL) for that year defined by 3 categories: (a) family income less than 100% of the FPL; (b) family income greater than or equal to 100% but less than 200% of the FPL; and (c) family income greater than or equal to 200% of the FPL;
5. education level of the household, defined by 3 categories: (a) less than high school; (b) high school graduate; and (c) greater than high school graduate;
6. dental and medical insurance status;
7. visit to the dentist for routine dental care in the past 12 months; and
8. family composition.

Weighted percentages and chi-square statistics were calculated for these variables comparing autistic children to nonautistic children. Multivariable logistic regression analysis was performed to determine the independent association of autism and fair or poor teeth, controlling for important covariates including: (1) age; (2) sex; (3) race/ethnicity; (4) household education; and (5) insurance status.

For children with reported fair or poor teeth, questions were asked about specific problems with their teeth, as defined by several categories: (1) pain; (2) cavities; (3) broken teeth; (4) misaligned teeth; (5) other tooth problems; (6) hygiene; (7) discoloration; (8) enamel problems; (9) gum problems; (10) bruxism; (11) nerves; and (12) no problems, but reported fair/poor condition. Sixty-nine autistic children and 7,002 nonautistic children were identified with fair or poor dentition. Chi-square statistics were used to determine if the dental status and oral needs of this subset of children with fair or poor teeth identified with autism were statistically different from the nonautistic children.

SUDAAN software (9.0, Research Triangle Institute, Research Triangle Park, NC) was used to account for the complex multistage sampling design of the survey. Descriptive analyses report weighted percentages, and bivariate statistics (chi-square statistics) reflect survey weights. The significance level was set at a $P<.05$.

Results

Overall, fewer than 1% of the parents in the survey reported that their children had autism. The parents or guardians of 52% of autistic children reported that their child's teeth were in excellent or very good condition, and 30% were reported to be in good condition (Table 1). In comparison, the parents or guardians of 69% of nonautistic children reported that their child's teeth were in excellent or very good condition and 22%

Table 1. PREVALENCE OF DENTAL HEALTH AND DEMOGRAPHIC CHARACTERISTICS BY AUTISM STATUS FOR 1- TO 17-YEAR-OLD CHILDREN, 2003 NATIONAL SURVEY OF CHILDREN'S HEALTH *

	Autism (N=495) %	No autism (N=95,059) %	*P*-value*
Condition of teeth			<.001
Excellent	26	43	
Very good	26	26	
Good	30	22	
Fair/poor	18	9	
Time since last saw dentist			.99
<1 y	78	78	
>1 y	22	22	
Has current health insurance	98	91	<.001
Has current dental insurance	80	78	.40
Saw dentist for routine dental care in past 12 mos	72	72	.98
Needed dentist for routine dental care in past 12 mos (of those without a dental visit in past 12 mos)	16	11	.43
Received all needed routine dental care in past 12 mos	88	93	.10
Sex			<.001
Male	78	51	
Female	22	49	
Household education			<.001
<high school	3	8	
High school	23	26	
>high school	74	66	
Age (ys)			<.001
1-5	17	29	
6-11	51	35	
12-17	32	36	
Race/ethnicity			.001
Hispanic	10	17	
White, non-Hispanic	71	61	
Black, non-Hispanic	15	15	
Other, non-Hispanic	4	7	
Poverty status			.91
<100%	19	18	
100-<200%	21	23	
>200%	60	59	
Family composition			.58
2-parent biological/adopted	59	63	
2 parents stepfamily	9	9	
Single mother, no father present	28	24	
Other	4	5	

* Chi-square tests of independent proportions were used for statistical comparisons.

Table 2. INDEPENDENT ASSOCIATIONS WITH FAIR OR POOR TEETH FOR 1- TO 17-YEAR-OLD CHILDREN, 2003 NATIONAL SURVEY OF CHILDREN'S HEALTH*

	Odds ratio	95% confidence interval	*P*-value*
Reported autism	2.3	1.5-3.6	<.001
Has current health insurance	1.6	1.4-1.9	<.001
Male Sex	1.1	1.0-1.2	.19
Household education			
<high school	3.4	3.0-4.0	<.001
High school	2.1	1.9-2.3	<.001
>high school (referent)	1.0		
Age (ys)			
1-5 (referent)	1.0		
6-11	2.1	1.9-2.4	<.001
12-17	1.6	1.4-.8	<.001
Race/ethnicity			
Hispanic	2.7	2.4-3.0	<.001
White, non-Hispanic (referent)	1.0		
Black, non-Hispanic	1.7	1.5-1.9	<.001
Other, non-Hispanic	1.6	1.3-2.0	<.001

* *t* tests were used for testing whether each individual regression coefficient is equal to 0 in multivariable logistic regression.

Table 3. PREVALENCE OF SPECIFIC DENTAL PROBLEMS BY AUTISM STATUS FOR 1- TO 17-YEAR-OLD CHILDREN, 2003 NATIONAL SURVEY OF CHILDREN'S HEALTH*

Specific problem with teeth (subset of children with fair/poor teeth)	Autism (N=69) 1%	No autism (N=7,002) 99%	*P*-value*
Pain	10	4	.50
Cavities	34	55	.11
Broken front tooth, teeth need repair	21	12	.33
Misaligned teeth, need braces	28	34	.59
Other tooth problem	0.2	3	<.001
Hygiene	13	4	.15
Discoloration	4	4	.94
Enamel problems	1	2	.70
Gum problems	0.2	1	.01
Bruxism, soft teeth, etc.	32	6	.15
Nerves	0	1	.001
No problems (but reported fair/poor condition)	0	2	.001

*Chi-square tests of independent proportions were used for statistical comparisons.

of these children were reported to have teeth in good condition. Parents or guardians participating in this survey who had an autistic child were more likely to report fair or poor condition of their child's teeth than those with nonautistic children (18% vs 9%, *P*<.001).

Table 1 presents data comparing children with and without autism, including: (1) demographic characteristics; (2) insurance status; (3) time since the last dental visit; and (4) data on treatment needs. Autistic children were more likely than nonautistic children to be: (1) 6 to 11 years old; (2) male; (3) non-Hispanic white; and (4) living in a household with more than a high school education (*P*<.001). Autistic children were more likely than nonautistic children to have current health insurance (*P*<.001). There were no differences in:

1. time of the last dental visit;
2. dental insurance status;
3. routine dental visit in the past 12 months;
4. need for routine dental care in the past 12 months; or
5. receiving all needed routine dental care in the past 12 months among autistic children and nonautistic children. As shown in Table 2, a multivariable logistic regression analysis reveals that autism was independently associated with having fair or poor teeth after adjustment for: (1) age; (2) sex; (3) race/ethnicity; (4) household education; and (5)insurance status (odds ratio=2.3; *P*<.001).

Data for the subset of children identified with fair or poor condition of their dentition are presented in Table 3. Autistic children were comparable to nonautistic children regarding: (1) dental pain; (2) presence of cavities; (3) broken teeth or teeth needing repair; (4) misaligned teeth; (5) hygiene; (6) discoloration; (7) enamel problems; or (8) bruxism. According to the survey, nonautistic children were more likely to have gum problems and problems with nerves (root canal/nerve problems, etc) and to have no specific problems with their teeth, even though their parents reported that the condition of their child's teeth was fair or poor.

Discussion

Overall, parents of US autistic children were more likely to report their children's dentition to be in fair or poor condition than were parents of US nonautistic children. This was true even after controlling for known factors associated with oral health status, such as: (1) race/ethnicity; (2) household education; and (3) other sociodemographic factors in a logistic regression model. Cavities, misaligned teeth, and teeth needing repair were the most prevalent specific dental problems reported by parents or guardians of children with fair or poor teeth, regardless of autism status. Autistic children with fair or poor teeth were also more likely to have problems with bruxism (32% vs 6%) and hygiene (13% vs 4%) than nonautistic children with fair or poor teeth. These differences were not statistically significant, however, possibly due to the limited sample size for these conditions among autistic children.

Autistic children are challenging to the dental team due to a reduced ability to communicate and relate to others.[9] They also have a limited attention span and a low frustration threshold. Preventive services, regular checkups, and hygiene visits would help familiarize these children with the dental routine and diagnose potential dental problems at an early stage. The management of autistic children in the dental office is often a time-consuming process and requires several visits before treatment can be initiated.[9]

As this study's data indicate, US autistic children were more likely than nonautistic children to have their dentition in fair or poor condition.

The American Academy of Pediatric Dentistry (**AAPD**) recognizes that behavior management of persons with special health care needs (**PSHCN**) could be challenging.[11] PSHCH are at increased risk for oral disease due to a diminished or limited ability to understand and assume responsibilities for their dental health and to cooperate with preventive oral health practices. Autistic children, however, should be referred for regular dental care as early as possible to establish a dental routine and to promote oral health. Education of the caregivers on the importance of good oral health of autistic children is strongly recommended, as it would likely help to prevent dental caries and its progression.

PSHCN may express a greater level of anxiety about dental care than individuals without a disability. According to the AAPD's recent Reference Manual, pediatric dentists are concerned about diminished access to oral health care for PSHCN as they transition to adulthood.[11]

The data obtained from this survey have several limitations. The sample size for the subset of autistic children and with fair or poor teeth is small. Some comparisons with nonautistic children appear to show a difference, but were not statistically different—which could be due to insufficient power. Data on specific dental problems were only obtained for those who reported fair or poor teeth, which prevented the ability to assess dental problems in children with better dental conditions. This was a cross-sectional survey of children's dental needs and status as reported by parents. These children were not examined by a dentist, and we speculate that these data underreport the actual dental disease. In addition, children's reported autism status was not verified by medical records and could be under- or over-reported.

This study also had several strengths. The NSCH was a nationally representative sample of US children from birth to 17 years of age and was one of the largest surveys conducted on the health of US children. This survey identified autistic children and collected detailed information on the condition of the children's teeth, regardless of autism status. This was the first known study that described the dental needs and dental status of autistic children in a nationally representative sample of children.

Conclusions

Based on this study's results, the following conclusions can be made:

1. Overall, parents of US autistic children were more likely to report their children's dentition to be in fair or poor condition than parents of US nonautistic children.
2. Autistic children and nonautistic children with fair or poor teeth are faced with similar dental problems.

References

1. Bertrand J, Mars A, Boyle C, Bove F, Yeargin-Allsopp M, Decoufle P. Prevalence of autism in a United States population: The Brick Township, New Jersey, investigation. Pediatrics 2001;108:1155-61.
2. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed TR. Washington DC: American Psychiatric Association; 2000.
3. Yeargin-Allsopp M, Rice C, Karapurkar T, Doernberg N, Boyle C, Murphy C. Prevalence of autism in a US metropolitan area. JAMA 2003;289:49-55.
4. Centers for the Disease Control and Prevention. Prevalence of autism spectrum disorders—Autism and developmental disabilities monitoring network, 14 sites, United States, 20002. MMWR CDC Surveill Summ 2007;56:12-28.
5. Kopel HM. The autistic child in the dental practice. J Dent Child 1977;44:302-9.
6. Shapira J, Mann J, Tamari I, et al. Oral health status and dental needs of an autistic population of children and young adults. Spec Care Dent 1989;9:38-41.
7. Lowe O, Lindemann R. Assessment of the autistic patient's dental needs and ability to undergo dental examination. J Dent Child 1985;52:29-35.
8. Morinushi T, Ueda Y, Tanaka C. Autistic children: Experience and severity of dental caries between 1980 and 1995 in Kagoshima City, Japan. J Clin Pediatr Dent 2001;25:323-8.
9. Klein U, Nowak AJ. Autistic disorder: A review for the pediatric dentist. Pediatr Dent 1998;20:312-7.
10. Blumberg SJ, Olson MR, Osborn L, Srinath KP, Giambo P. Design and operation of the National Survey of Children's Health, 2003. National Center for Health Statistics. Vital Health Stat 1 2005;1:43.1-131.
11. Guideline on management of persons with special health care needs. Reference Manual 2006-07. Pediatr Dent 2006;28:85.